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MAR 17 2003
Federal Communications Commission
Office of Secretary

March 14, 2003
Our Ref.: W-1067-A

FCC's Secretary
Office of the Secretary
Federal Communications Commission
445 12th Street, SW. TW-A35
Washington, DC 20554

Re: Dedicated Short-Range Communications Services in the 5.850-5.925 GHz Band [WT Docket No. 01-90; ET Docket No. 98-95; RM-9096; FCC 02-302]

Nissan North America, Inc., with the authorization of Nissan Motor Company, LTD of Tokyo, Japan, the manufacturer of Nissan and Infiniti vehicles ('Nissan'), transmits the following comments in response to the notice of proposed rulemaking published by the Federal Communications Commission in Vol. 68, No. 10 of the Federal Register on January 15, 2003.

Please place these comments in the appropriate public docket.

Sincerely,

Harland Reid

Harland Reid
Senior Director, Government Affairs
Nissan North America, Inc.

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Enclosure

NISSAN MOTOR COMPANY, LTD.
COMMENTS ON:
Federal Communications Commission
Notice of Proposed Rulemaking and Order
Docket No. FCC 02-302
68 Fed. Reg. No. 10; January 15, 2003
Dedicated Short-Range Communication Services
5.850-5.925 GHz Band (5.9 GHz Band)

Nissan Motor Co., Ltd. (Nissan) appreciates the opportunity to comment on this Notice of Proposed Rulemaking (NPRM) and offers the following specific comments addressed to particular paragraphs in the NPRM and Order adopted November 7, 2002 (FCC 02-302). Through the experience of developing the onboard Electric Toll Collection (ETC) unit, Nissan understands that wireless communications, both between vehicles and between vehicles and infrastructure, have the potential to significantly improve the safe operation of motor vehicles. Nissan, in fact, has previously been engaged in several preliminary feasibility studies of DSRC (Dedicated Short-Range Communications) for vehicle safety applications via involvement in several Japanese, government-funded research programs.

To further pursue this potential, BMW, DaimlerChrysler, Ford, GM, Nissan, Toyota, and VW formed the VSC Consortium (VSCC) to participate in a cooperative project with the United States Department of Transportation. The Vehicle Safety Communications (VSC) Project is a two-year program that began in May 2002 to evaluate potential vehicle safety applications enhanced or enabled by wireless communications, determine associated communication requirements, and to promote their accommodation in developing communications standards. In particular, the VSCC has been actively working with standards development organizations to ensure that proposed 5.9 GHz DSRC protocols support vehicle safety applications.

The FCC Rulemaking authorizing the use of the 5.9 GHz DSRC spectrum is very important for automotive manufacturers. Nissan has learned that strong leadership is indispensable for the deployment of DSRC-based, vehicle-safety applications. Therefore, Nissan greatly appreciates the FCC's leadership and will strongly support its initiative through involvement in the VSC Project.

Rules that guarantee the availability of this 5.9 GHz spectrum for the long-term support of vehicle safety applications will be necessary to achieve the anticipated, significant safety benefits. Modern automobiles have a long life cycle in comparison with consumer electronics devices, in many cases extending to ten years or more. As well, the development times for particular vehicle models are very long in comparison with consumer electronics products, generally spanning two or three years. The deployment of vehicle safety applications enabled by DSRC communications will therefore take some time, and the anticipated safety benefits will accrue over a much longer period as the percentage of vehicles, and infrastructure, equipped with these systems grows over time.

Nissan supports the 5.9 GHz DSRC spectrum use concept that allows private applications to share the spectrum with public safety applications. However, it is important that the public safety applications retain the highest priority for access to the spectrum, and the private applications do not interfere with the operation of the public safety applications. Allowing such a mixture of applications on this spectrum may lead to earlier and wider deployment of DSRC devices, while preserving the intended use of the spectrum for public safety applications.

Nissan offers the following specific comments addressed to particular paragraphs in the NPRM text:

Comments on NPRM Paragraph #2.
Nissan supports the FCC's efforts to *"propose service rules to govern the licensing and use of the 5.850-5.925 GHz band (5.9 GHz band) for Dedicated Short-Range Communications (DSRC) services in the Intelligent Transportation System (ITS) radio service."* The early results from VSCC research indicate that DSRC at 5.9 GHz has the potential to provide the low-latency wireless communications that would be necessary to support most of the vehicle safety applications envisioned by the VSCC. The low-latencies achievable with DSRC do not appear to be possible using other wireless communications technologies that are widely available or currently being planned for wide deployment.

Comments on NPRM Paragraph #5
Nissan feels that the vehicle safety applications being studied by the VSCC are consistent with the ITS National Architecture, and contemplated expansions thereof. In particular, these vehicle safety applications are relevant to the categories of Advanced Vehicle Safety Systems and other User Service Bundles described in ITS America's July *Ex Parte* Comments.

Comments on NPRM Paragraph #18
Nissan supports the position that the 5.9 GHz band should be used primarily for *"public safety"* purposes. The vehicle safety applications being studied by the VSCC are specifically focused upon "preventing motor vehicle crashes", and in so doing, ensuring *"(t)he prevention of injuries, fatalities, and property damage..."*. The realization of this goal would clearly *"benefit the public on both the societal and individual level"*. Nissan maintains that the vehicle safety applications currently under study fall directly within the realm of *"public safety"*.

Comments on NPRM Paragraph #19
As described in the previous section, the vehicle safety applications being studied by the VSCC are directed toward protecting *"the safety of life, health, or property"*. However, these applications, if deployed by automotive manufacturers, would not be operated by any service provider, but would rather represent standardized data communications between vehicles, and between vehicles and infrastructure, that would allow a vehicle-based system, for example, to warn the driver of danger. If these safety systems are provided as an intrinsic part of an automobile, but there are no service providers, or service fees, associated with the vehicle safety applications, then this would appear to meet the requirement that the services *"are not made commercially available to the public"*.

The vehicle safety applications being studied by the VSCC are part of Advanced Vehicle Safety Systems. The portions of the definition of "public safety radio services" that seem to cause confusion in relation to these vehicle safety applications, are those that attempt to define the *"user"* or *"provider"* of *"public safety radio services"* as entities, either governmental, or non-governmental. This definition seems fairly clear in the case of infrastructure-initiated communications, for example, an intelligent traffic signal that broadcasts its location and signal phase information on a periodic basis. However, a significant portion of the envisioned vehicle safety applications would rely upon *ad hoc*

communications between vehicles. These *ad hoc* communications would depend upon standards, standard protocols and standard message sets to provide useful information to other vehicles within receiving range. Each vehicle receiving such information would evaluate the situation according to the algorithms programmed into its on-board systems, and take whatever actions the systems were programmed to take under those circumstances. In such cases, the entity providing the service is not clear. It could be variously interpreted as the automobile driver, the automobile manufacturer, the government entity operating that segment of roadway, or even the standards development organization (SDO) that developed the standardized protocol.

Furthermore, the *ad hoc* vehicle safety applications would become much more valuable as they become more widely deployed. The definition of a service "not made commercially available to the public" includes a statement to the effect that it *"is not available to a substantial portion of the public"*. The *ad hoc* vehicle safety applications should be available to a substantial portion of the public, since the widest possible deployment has the highest potential safety benefits. This conundrum indicates that the currently proposed definition of *"public safety radio services"* may not be adequate to describe a significant portion of the vehicle safety applications being studied by the VSCC, even though these applications would not be commercial telecommunications services, since no compensation would be expected for the communications.

Comments on NPRM Paragraph #20

The vehicle safety applications being studied by the VSCC are clearly part of the *"many DSRC-based ITS applications"* that *"will be used to reduce the number of injuries and fatalities and the amount of property damage due to motor vehicle crashes."* In the case of infrastructure-initiated vehicle safety applications, the entity operating the service seems to be fairly clearly defined, and could generally be expected to fall within the definition of *"public safety radio services"*, as described in paragraph #19. The case of vehicle-initiated safety applications, however, is not adequately covered under this definition (please see the discussion under paragraph #19 for additional information). The question of which *"entity"* operates, or uses, a service leads to confusion in the case of *ad hoc* vehicle safety applications.

An addition should be made to *"public safety radio service"* definition to specifically include ITS vehicle safety applications. This category would include non-commercial vehicle safety applications whose primary purposes are consistent with Section 309(j)(2) of the Communications Act of 1934, in that they *"(i) are used to protect the safety of life, health, or property; and (ii) are not made commercially available to the public."* In this case, the definition of non-commercial would need to be updated to specify that no subscriptions, fees, or other usage-based charges should apply to the telecommunications that enable these applications, while still allowing for wide availability of the applications to the public. Although the realization of the potential safety benefits from the wide deployment of vehicle safety applications would clearly contribute to the public good, there would be no incentive for any entity to bid for spectrum during an auction process in order to provide these types of vehicle safety applications. The addition of such a new category for ITS vehicle safety applications, in conjunction with the prior definition of *"public safety radio services"*, should provide sufficient inclusion for the vehicle safety applications that are being envisioned by the VSCC.

Comments on NPRM Paragraph #21

The *"public safety services"* definition described in paragraph #21 appears to be overly restrictive for the uses of 5.9 GHz DSRC that are being studied by the VSCC. The strict adoption of this definition may rule out the deployment of approximately half of the vehicle safety applications being studied by the VSCC. If the 5.9 GHz DSRC system would not be able to support half of the envisioned vehicle safety applications, then it is doubtful that this system would be adopted by automotive manufacturers to support the remaining vehicle safety applications. It is more likely that another technology would be chosen to support the vehicle safety applications.

Comments on NPRM Paragraph #25

Through its involvement with VSCC, Nissan has determined the fundamental need for nationwide interoperability for vehicle safety applications, and fully supports the efforts of the DOT and ITS America to ensure that 5.9 GHz DSRC is interoperable throughout the United States through a single set of DSRC standards. This is necessary so that vehicle-to-vehicle safety applications on one brand of vehicles will be able to interact with vehicle-to-vehicle safety applications on another brand. In addition, many envisioned vehicle safety applications use vehicle-to/from-infrastructure communications, with Road Side Units (RSUs) providing the infrastructure component of the vehicle safety applications. This necessary interaction between vehicles and infrastructure will require a nationwide standard to ensure that these safety applications will operate in the same way in one region of the country as in other regions. Nissan also encourages the efforts by all involved parties to integrate 5.9 GHz DSRC development efforts on a consistent basis throughout North America, through coordination efforts with Canada and Mexico.

Comments on NPRM Paragraph #31

Nissan supports the position taken by the DSRC Standards Writing Group, and promoted by ITS America, that the only reliable way to ensure nationwide interoperability is through the adoption of a single set of DSRC standards. In particular, Nissan supports ITS America's recommendations toward achieving national interoperability for DSRC as set forth in TEA 21. Nissan agrees with ITS America that the most effective mechanism to realize that goal is for the FCC to require compliance with the ASTM-DSRC Standard. In order to fully ensure the desired degree of interoperability, both public safety and non-public safety users should be required to conform all operations and equipment to the ASTM-DSRC Standard. This is necessary to ensure that automobiles from various manufacturers will be able to communicate with each other, and with the RSUs from various transceiver manufacturers in the infrastructure, to support vehicle safety applications.

Comments on NPRM Paragraph #32

Modern automobiles have a long life cycle in comparison with consumer electronics devices, in many cases extending to ten years or more. As well, the development times for particular vehicle models are very long in comparison with consumer electronics products, generally spanning two or three years. In order to be considered for integration into production-line automobiles, automotive manufacturers must be certain of long-term technical stability at the basic levels of DSRC technology. This long-term technical stability can best be ensured by the FCC requiring compliance with the ASTM-DSRC Standard for all operations on the 5.9 GHz DSRC spectrum, since it is unlikely that the industry is cohesive enough to adopt a single standard without an FCC rulemaking.

Comments on NPRM Paragraph #33

As discussed in the previous section, the automotive manufacturers must be certain of long-term technical stability at the basic levels of DSRC technology before committing to including DSRC vehicle safety applications in production automobiles. Nissan supports the view of ITS America that the best way to ensure this long-term technical stability is for the FCC to require compliance with the ASTM-DSRC Standard for all operations on the 5.9 GHz DSRC spectrum.

Comments on NPRM Paragraph #34

Nissan recommends that the FCC adopt the ASTM Lower Layer DSRC Standard for all DSRC operations in the 5.9 GHz band, and that this adoption include subsequent revisions to the ASTM Lower Layer DSRC Standard. In general, the lower protocol layers are implemented in silicon chip sets, while the upper layers are implemented in software. By specifying the ASTM Lower Layer DSRC Standard in the FCC rules for the use of the 5.9 GHz spectrum for DSRC, long-term stability is ensured at the hardware level. By allowing for more rapid technological improvement at the upper layers of protocol, the efficient updating of DSRC through software upgrades could also be supported. The ASTM standards development and revision process appears to be capable of making certain that future revisions to the lower layer standard will continue to support the earlier implementations of the standard, thus ensuring long-term stability in the fundamental technical hardware basis for DSRC.

Comments on NPRM Paragraph #35

The vehicle safety applications being studied by the VSCC utilize both vehicle-to-vehicle and vehicle-to/from-roadside methods of communications, with approximately one half of the applications falling into each category. Especially in the initial stages of deployment, it will be necessary to have a complete DSRC communications solution based upon a single On Board Unit (OBU) in order to meet automotive vehicle manufacturers' needs for factory installation of DSRC. These needs include both reasonable cost and low complexity of OBU units to be installed, as well as the associated antennas and cabling.

The Band Plan illustrated in the NPRM shows one channel (channel 172) solely for vehicle-to-vehicle applications. Vehicle-to-vehicle communications should not be segregated from other DSRC communications. This segregation of vehicle-to-vehicle communications into channel 172 represents an obsolete view of DSRC operations. The original concept, embodied in the illustrated Band Plan, was to have all vehicle safety applications operate on channel 172, since it was assumed that all such applications would be based upon vehicle-to-vehicle communications. However, vehicle safety applications being studied by the VSCC, and whose requirements have been proposed to the DSRC Standards Writing Group, include both applications that require vehicle-to-vehicle communications and applications that require communication with infrastructure units. Implementation of an approach for vehicle safety requiring vehicle-to-vehicle communications on a separate channel from vehicle-to/from-infrastructure communications is likely to preclude the feasibility of automotive manufacturers deploying the envisioned vehicle safety applications on 5.9 GHz DSRC.

As a result, it has already been well-agreed within the DSRC Standards Writing Group that vehicle-to-vehicle communications will be allowed to occur on the Control Channel (Channel 178), and will not be necessarily disallowed on service channels. At the July 2002 DSRC Standards Writing Group meeting, in particular, the group agreed in principle that simple vehicle safety applications that do not violate the proposed operational rules of the Control Channel may be operated on the Control Channel, even if they are vehicle-to-vehicle based.

The label under *"CH172"* in the Band Plan illustration accompanying paragraph #35 should be changed from *"service (vehicle-to-vehicle)"* to *"service (high-availability, low-latency)"*. Please also see comments under paragraph #36 for related discussion points.

Comments on NPRM Paragraph #36

Nissan supports the general channelization plan, and the use of the modified IEEE 802.11a standard, as contained in the ASTM Lower Layer DSRC Standard. However, one small, but important, modification to the channelization plan is recommended by Nissan. An immediate, massive deployment of vehicle-to-vehicle and vehicle-to/from-infrastructure safety applications on the Control Channel is not expected, due to the existing base of non-DSRC equipped vehicles. In the future, though, a significant penetration of these applications, in conjunction with other uses of the Control Channel, may significantly impact the Control Channel capacity. To plan for that time, some portion of the 5.9 GHz DSRC band must be dedicated so that vehicle safety applications can migrate away from the Control Channel as capacity limits are approached on the Control Channel. It is imperative for automobile manufacturers to have assurance that this communications capability will be available in the longer-term, in order for a commitment to be made by the manufacturers to deploy 5.9 GHz DSRC-based vehicle safety applications. Channel 172 (previously dedicated as the "vehicle-to-vehicle" channel) should therefore be re-dedicated as the High-Availability, Low-Latency DSRC channel to effectively support vehicle safety and other high-priority applications. This channel should be limited to only transmissions related to high-priority applications, in order to prevent low-priority transmissions from limiting the availability of the channel, or increasing the latency of communications on the channel.

Comments on NPRM Paragraph #37

While the general operations of the proposed DSRC Control Channel are accurately described in this paragraph of the NPRM, it is premature to explicitly state the time parameters for the Control Channel. The time parameters that are stated in this paragraph are not acceptable, since the adoption of these values would prevent the use of the Control Channel for the vehicle safety applications being studied by the VSCC. Various research activities are currently underway to determine the most efficient and effective time parameters for the Control Channel. These research activities include simulation studies presently being conducted by the VSCC and others. The results of these research activities will be provided to the DSRC Standards Writing Group so that appropriate time parameters can be incorporated into relevant DSRC standards.

Comments on NPRM Paragraph #40

It is not feasible in early implementations to require automobiles to have two separate DSRC units to conduct vehicle safety applications (please also refer to comments regarding paragraphs 35 and 36). Such a "two-unit" approach may preclude or seriously delay the deployment of DSRC-based vehicle safety applications by automotive manufacturers. Vehicle safety applications being studied by the VSCC include a number of intersection collision avoidance and cooperative collision avoidance applications that must use the Control Channel in order to be effectively deployed. In order to support these vehicle safety applications, both vehicle-to-vehicle and vehicle-to/from-infrastructure safety applications must coexist on the Control Channel, especially during the early deployment years.

Comments on NPRM Paragraphs #51

Nissan strongly supports ITS America's position that OBUs should be licensed by rule. The use of unlicensed units on the 5.9 GHz DSRC frequencies is likely to cause interference with vehicle safety applications in terms of reduced channel availability and capacity, especially regarding the Control Channel, as well as increased latency.

Comments on NPRM Paragraphs #53

As discussed above, Nissan recommends that OBUs be licensed by rule. Unlicensed operations under Part 15 in the 5.9 GHz vicinity should remain confined to the 5.725-5.875 GHz range, as is presently the case. The majority of the vehicle safety applications being studied by the VSCC have inherent requirements for extremely low-latency communications. Of the potentially available wireless communications technologies, DSRC is uniquely suited to being able to support these latency requirements. The operation of unlicensed units on the 5.9 GHz DSRC frequencies would be expected to increase the system latency through direct interference, as well as through reduced channel availability. In addition, channel capacity, especially for the Control Channel, is already an area of technical concern within the DSRC Standards Writing Group. The use of unlicensed units on the Control Channel, in particular, could readily create overload conditions on this critical channel.

Comments on NPRM Paragraphs #54

Nissan recommends licensing the OBUs by rule, to ensure that all the OBUs will be required to comply with the ASTM Lower Layer DSRC Standard for all DSRC operations within the 5.9 GHz ITS spectrum. The stated definitions for Citizens Band Radio Service and Radio Control Service are not directly applicable for the expected ITS usage of the 5.9 GHz DSRC spectrum, but these services do serve to illustrate the effective use of licensing by rule. Allowing unlicensed operations for OBUs under Part 15 would be undesirable in terms of interfering with use of this spectrum for its intended ITS purposes. The vehicle safety applications being studied by the VSCC, which primarily depend upon OBUs not associated with a fixed system, appear to meet the stated objectives of the "public safety radio services", except for the issue (discussed in the comments to paragraphs #18, #19 and #20) related to which *"entity" "uses"* or *"operates"* the service. The best approach may be to define, and have authorized, a new license by rule service that specifically includes in its definition the eight User Service Bundles identified in the ITS National Architecture.